

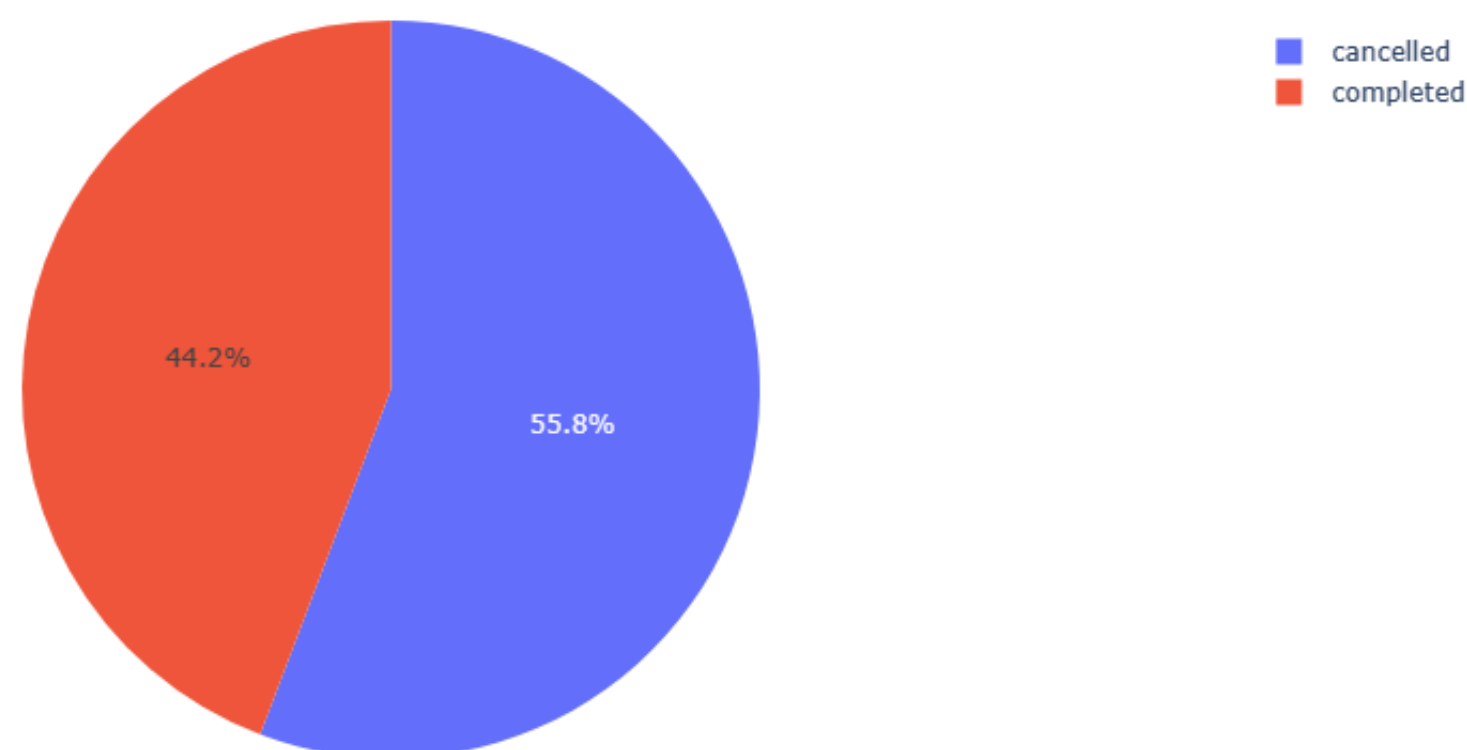
Retail Industry AI-ML Case Study

In today's competitive retail market, providing an exceptional customer experience is critical for businesses to succeed. One key aspect of this is ensuring that customer orders are completed successfully and in a timely manner. However, order cancellations can have a significant impact on a retail business, resulting in lost revenue and a poor customer experience.

To proactively prevent cancellations and improve order completion rates, retail businesses can leverage Auto-ML to analyze historical data on customer orders and identify patterns that are associated with cancelled orders. In this project, we will use Auto-ML techniques to develop a model that can accurately predict whether a customer order will be cancelled or completed based on available data on the customer, order, item, and payment method.

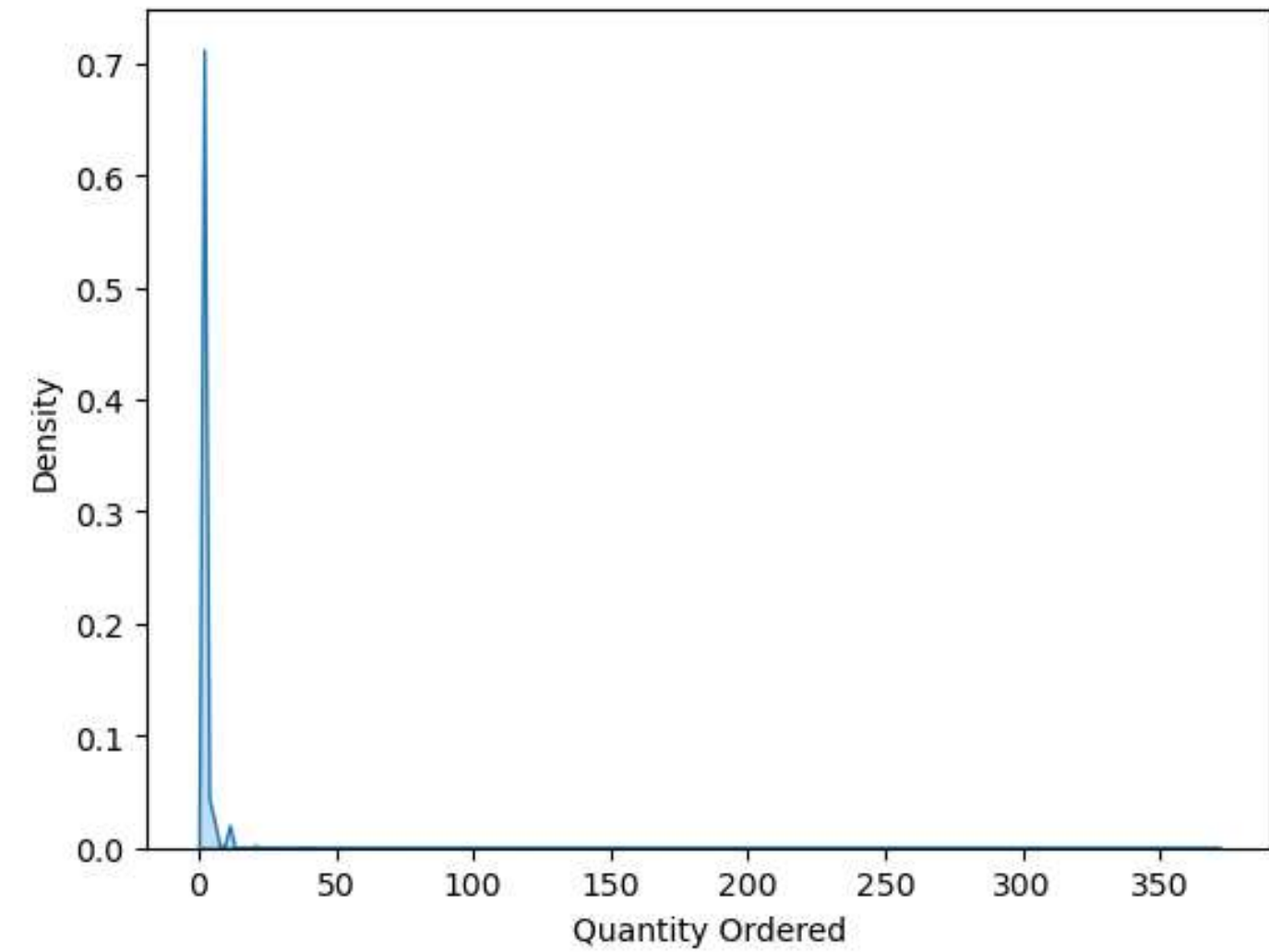
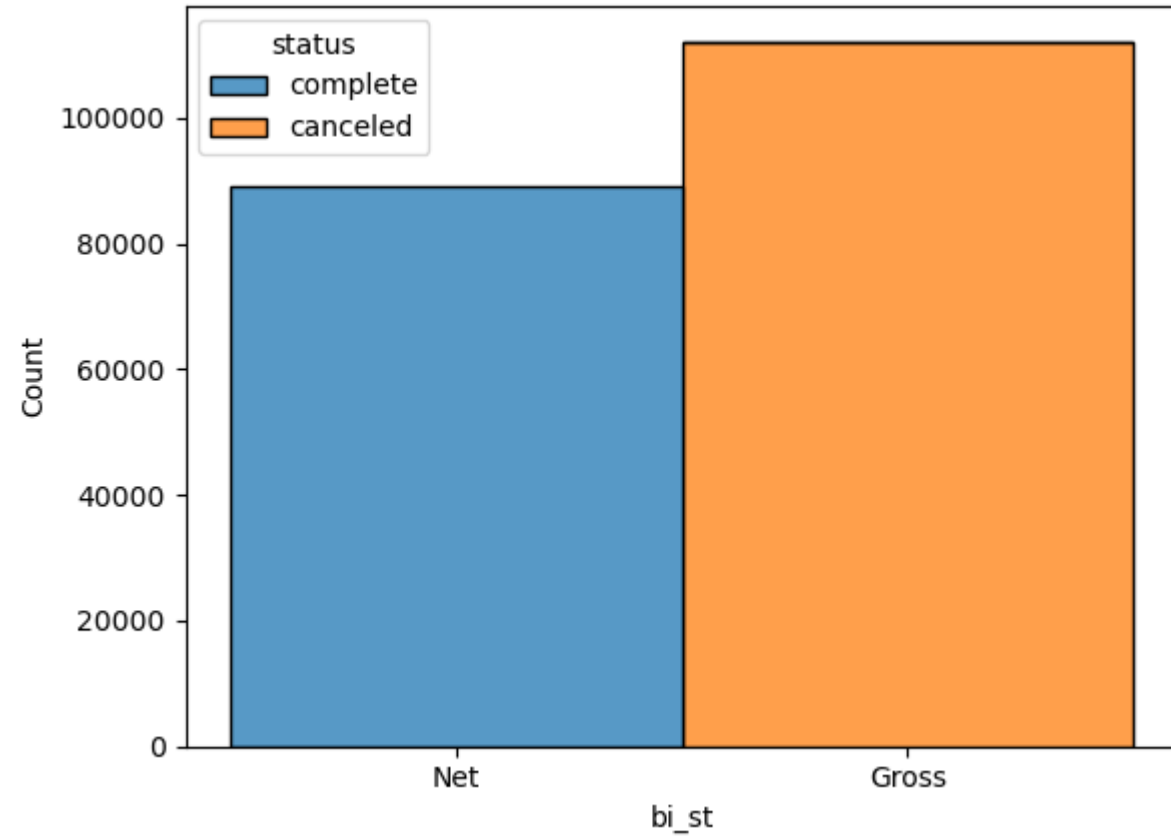
Finally, we will identify the most important features that contribute to the prediction of order cancellations and completion, and provide actionable insights to the retail business on how to prevent cancellations and improve order completion rates based on the findings from the Auto-ML model.

Class Distribution



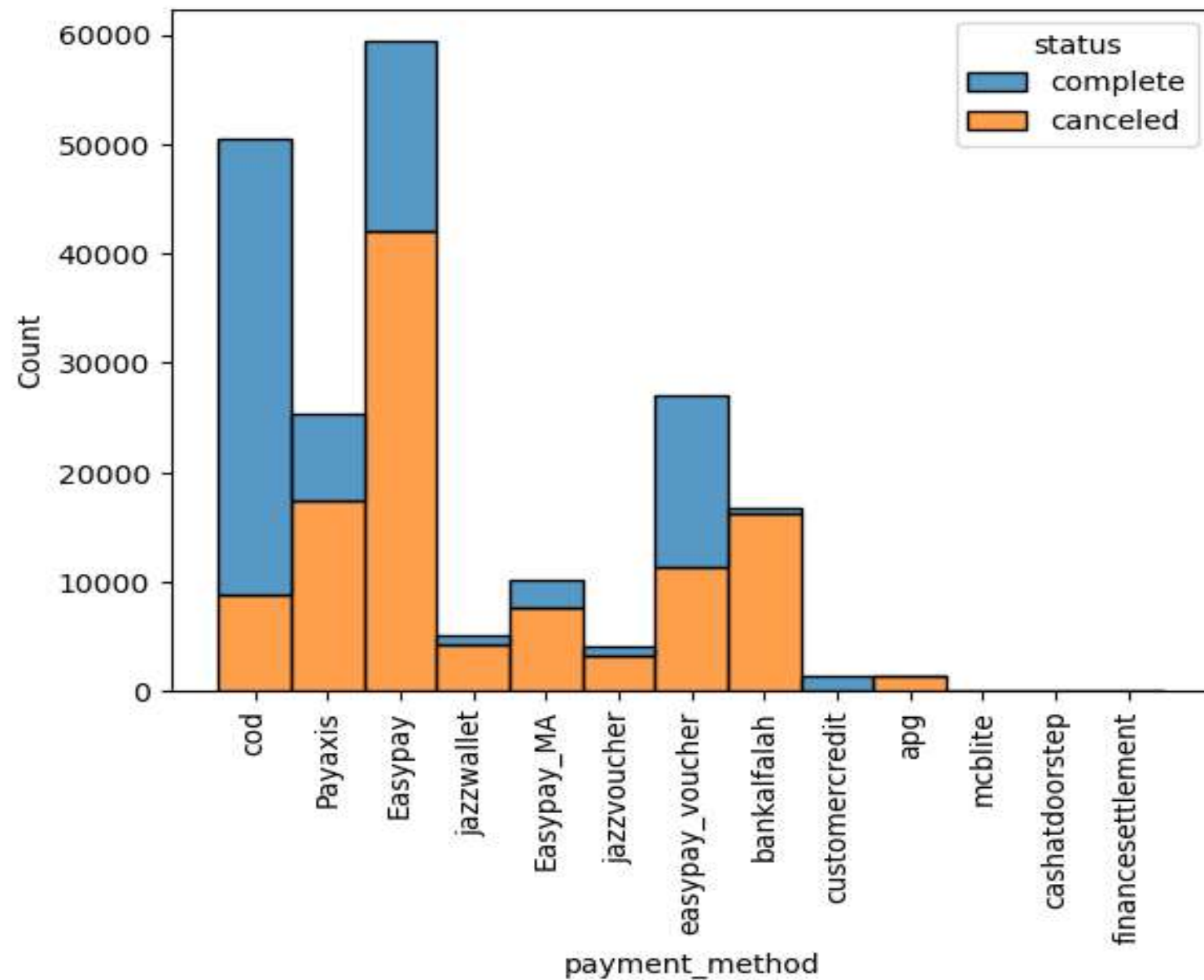
Order Status	No. of Orders
Completed	88968
Cancelled	112116
Order Completion Rate	44.2%
Order Cancellation Rate	55.8 %

Features Responsible



Billing type: Under gross method, sales are recorded at full invoice value without considering discount. Under net method, sales are recorded at value arrived at after reducing cash discount from invoice value.

Quantity Ordered: The number of quantities purchased can impact in several ways by monitoring and adjusting pricing, inventory management, customer satisfaction, and marketing strategies retail businesses can increase order completion rate and revenue.



Payment Method: By offering multiple payment options, communicating clearly about payment policies, implementing fraud detection measures, providing excellent customer service, and monitoring payment metrics, businesses can improve their order cancellation and completion rates and provide a better customer experience.

Auto-ML Methodology Results

Algorithms	Test Accuracy (25 percentile)	Test Accuracy (50 percentile)	Test Accuracy (75 percentile)	Test Accuracy (90 percentile)
Decision Tree	100	100	100	100
Random Forest	100	100	100	100
XGBoost	100	100	100	100
MLP	88.7	90.76	99.61	98.72
RNN	66.05	72.89	66.59	66.49
Total Features	12	23	34	41
Avg. Accuracy	90.95	92.73	93.24	93.042

- Based on our observation from the standard ML algorithms, 75th percentile has the best average accuracy.
- Decision Tree, Random Forest and XGBoost was the best performing algorithm with 100% accuracy in all percentile.

Conclusion

In this case study, we applied Auto-ML techniques to predict whether customer orders in a retail business will be cancelled or completed. We leveraged a dataset containing information about the customer, order, item, and payment method to develop and evaluate a Auto-ML model using various classification algorithms. By developing a Auto-ML model that accurately predicts order cancellations and completion, the retail business can proactively take action to prevent cancellations and improve order completion rates. The dataset has 201,134 records with 24 Categorical Features and 12 Numerical Features.

For classification, models were created with algorithms using Auto-ML techniques like Decision Tree, Random forest, XGBoost, Multilayer Perceptron and Recurrent Neural Network. With these models, performance measurement values were obtained for feature sets of 12, 23, 34 and 41. The Auto-ML algorithms were able to predict the order cancellations and completion with an average accuracy between 90% – 100% and helped to identify factors that determine the order cancellations and completion.

The major factors include Billing Type, Quantity Ordered and Payment Method. Overall, the potential of Auto-ML in the retail industry and highlighted the importance of leveraging data to gain insights and make informed decisions.